

## Microcontrollers 2<sup>o</sup> exam

Q1) Find the value of MYREG so as to have a delay time of 0.3504 ms. 20MHz

```

MOVW 0xH
MOVWF MYREG
again  NOP
      NOP
      NOP
      NOP
      Decf MYREG, F
      Bnz again
      return
    
```

Q2) a switch is connected to RCT, write a prog. to get the status of the switch and save it in D7 of file reg location 0x30.

Q3) assuming a system freq. of 10MHz, write a prog. to generate a square wave of 50Hz freq. on pin portB.7. use timero, 16bit, positive edge, with prescaler = 128.

Q4) for the following prog.

a) we want to use location 7 for COUNT.

b) what is the content of the following location in prog. memory.

4, 5, 6, 7, B, D

محتوى الرفع بواسطة 7. 0x0000

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LOC	OBJECT CODE	LINE	SOURCE TEXT
VALUE		00001	
		00002	
		00003	
00000007		00004	
00000008		00005	
		00006	
000000		00007	
000000 0E00		00008	MOVLW 0
000002 6E07		00009	MOVWF COUNT
000004 EC06 F000	BACK	00010	CALL DISPLAY
000008 EF02 F000		00011	GOTO BACK
		00012	
		00013	; increment and put it in PORTB
00000C 2A07		00014	DISPLAY INCF COUNT,F ;increment count
00000E C007 FF81		00015	MOVFF COUNT,PORTB ;send it to PORTB
000012 EC80 F001		00016	CALL DELAY
000016 0012		00017	RETURN ;return to caller
		00018	
		00019	; this is the delay subroutine
000300		00020	
000300 0EFF		00021	DELAY MOVLW
000302 6E08		00022	MOVWF MYREG
000304 0000	AGAIN	00023	NOP ;no operation wastes clock cycles
000306 0000		00024	NOP
000308 0000		00025	NOP
00030A 0608		00026	DECF MYREG,F
00030C E1FB		00027	BNZ AGAIN ;repeat until MYREG becomes 0
00030E 0012		00028	RETURN ;return to caller
		00029	END ;end of asm file



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50

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Q1 Freq: 20 MHz  $\Rightarrow \frac{20}{4} = 5 \text{ MHz} \Rightarrow T = 0.2 \mu\text{s}$

$(7 * X) + 1) 0.2 \mu\text{s} = 0.3504 \mu\text{s}$

$1.4 \text{ MHz} * X + 0.2 \mu\text{s} = 0.3504 \mu\text{s}$

12

~~$1.4 \text{ MHz} * X = 0.3502 \mu\text{s}$~~

$1.4 \text{ MHz} * X = 0.3502 \mu\text{s} \Rightarrow X = 250 = H$

MOV LW 250 H

Q2 D7 EQU 0x30

~~BSF~~

PortC EQU F82H

TRISC EQU F90H

BSF TRISC, 1

BCF D7, 0x30

4

~~BTFSS~~

BTFSS PortC, 1

MOVWF D7, 0x30

~~BSF~~ - here

~~- BSF~~

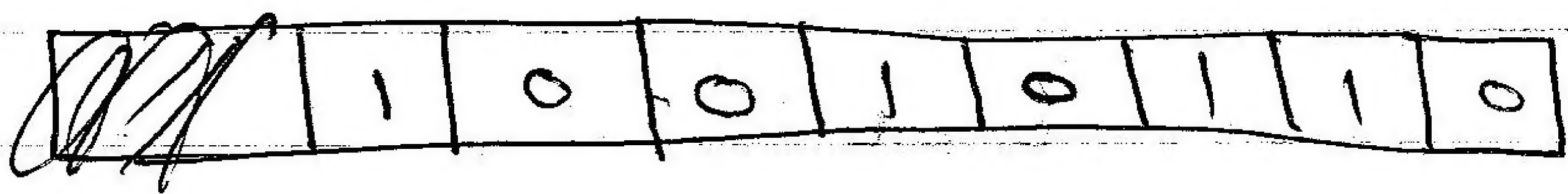
MOVWF D7, 0x30

END



2	0	0	2
0	0	1	4
6	1	6	8
0	1	1	16
1	0	6	32
1	0	1	64
1	1	6	128
1	1	1	

Q3 |  $f_{req} = 10\text{MHz}$



$\frac{10\text{MHz}}{4} = 2.5\text{MHz} \Rightarrow T = \frac{1}{2.5\text{MHz} \times 128} = 3.125\mu\text{s}$

F square wave = 50 Hz  $\Rightarrow \frac{50\text{Hz}}{2T} \Rightarrow T = \frac{1}{100\text{Hz}} = 0.01\text{ms} =$

$\Rightarrow$  FFFF - initial: ~~no~~ no. of loop

$\frac{0.01}{0.4 \times 10^{-6}} = 25000 \Rightarrow \text{FFFF} - 25000 = \text{no. of loop}$   
 $65536 - 25000 = 40536$

40536  $\rightarrow$  to hexa  $\Rightarrow$  9F38

~~9F38~~ F380

15	62336	
	<del>40536</del>	18
16		
17		
18		
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31		

now programming

TRISB EQU F93H

port B.7 EQU F81H

BSF TRISB.7 ✓

again BSF portB.7

call delay

BCF portB.7

go to again

~~delay~~ delay

7

delay

~~START~~  
 BSF Tocon, TMROCN  
 BCF INTCON, TMROIF.  
 MOV LW X80  
 MOVWF THROH  
 MOV LW XF3  
 MOVWF THROH  
 BSF Tocon, TMROCN  
 again BTFSS INTCON, TMROIF  
 go to again  
 BCF Tocon, TMROCN  
 go to ~~again~~ start



Q4

(a) Count EQU 0X7

(b)

10

1- Location 4 Contains EC

2- Location 5 Contains 06

3- Location 6 Contains F0

4- Location 7 Contains 00

5- Location B Contains 00

~~6- Location D Contains 07~~

~~6- Location D Contains 07~~

0004	EC
0005	06
0006	F0
0007	00
0008	EF
0009	02
000A	F0
000B	00
000C	2A
000D	07